Ontario Emissions Trading: Review and Assessment

Alberta Environment

June 25, 2002

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A) Introduction

The implementation of the Ontario's Emissions Trading Code (the Code) introduces the use of market-based instruments (MBIs) for reducing emissions of nitric oxide (NO)* and sulphur dioxide (SO_2) in that province. This step is intended to help Ontario move ahead on environmental objectives in ways that are consistent with many of the Ontario Government's key economic objectives including: reducing the deficit, ensuring a sound financial footing for environmental infrastructure and services, encouraging innovation, and enhancing competitiveness[1]. The Code is intended to supplement the Ontario Regulation 397/01 that governs emissions trading made under the Ontario Environmental Protection Act.

MBIs, such as emission trading, allow the market to drive pollution reduction initiatives through the "polluter pays principle" and aim to internalize environmental costs that are otherwise borne by the ecosystem and society. Emissions trading can achieve the same environmental objective as conventional command and control measures, and is particularly valuable when the objective is achieved at substantially reduced social costs. Emissions trading gives the emitters freedom to choose and adapt their activities, and implement least cost solutions. It also encourages research and development to find and apply new emissions-reducing technologies.

Ontario has taken the initiative and started the first provincial air emissions trading program in Canada[2]. Their experience serves as one model that other provinces, including Alberta, can examine and from which they can learn.

B) History of the Emissions Trading Program in Ontario

The Pilot Emissions Reduction Trading (PERT) project ran from 1996 to 2001 in Ontario. Its purpose was to assess the effectiveness of emissions reduction credit trading[3]. Stakeholders, including government, industry, environmental and health groups, voluntarily participated in this small-scale trial of emissions trading scheme. The initial focus of PERT was emissions of nitrogen oxides (NOx) and volatile organic compounds (VOC) in southern Ontario, but it has expanded to include carbon dioxide (CO_2), sulphur dioxide (SO_2) and carbon monoxide (CO) in 1997[4]. The project is seen to have achieved its goal, since it helped establish a broader understanding of MBIs, including the cost-effectiveness and emissions reductions that are achievable through an emissions credit trading system[5].

On February 7, 2001, when the Ministry of the Environment for Ontario accepted the report from Val Gibbons, a former deputy minister, entitled, *Managing the Environment: A Review of Best Practices*, it signaled a fundamental shift in how Ontario would go about protecting the environment[6]. The new course of action is a broad, integrated series of regulatory and non-regulatory initiatives, from policy development through to enforcement.

An objective of the implementation of the "Gibbon's Report" is the improvement of air quality in Ontario in a way that enables Ontario to set the pace as "A North American leader in air quality"[7]. Ontario has taken several implementation steps:

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* The Code specifically discusses NO and not NOx

May 2, 2001: Release of the Ontario Air Quality and Climate Change Strategy by the Honourable Elizabeth Witmer, Minister of the Environment for Ontario[8]: This strategy explores market mechanisms and incentives to reduce air pollution.

May 2, 2001: Mandatory monitoring and reporting of emissions expanded[9]: Emissions monitoring and reporting increased from 28 substances, reported only by electricity generators as of January 1, 2000, to include large industries with a total list of 358 pollutants, including a full suite of greenhouse gases.

June 25, 2001: Capacity to conduct inspections improved[10]: Ontario enhanced the Environmental SWAT Team approach and related technological innovations to include inspection and enforcement activities.

Oct 24, 2001: Introduction of hard emissions caps for the electricity sector[11]: Ontario introduced a "cap, credit and trade" system for the electricity sector for NOx and SO_2. This format is a combination of the "cap and trade" and "baseline and credit" systems. Ontario is considering expanding this system to major industrial emitters such as the pulp and paper sector, cement and concrete, iron and steel, petroleum refineries, chemicals, and non-iron smelters.

Jan 1, 2002: New emissions caps take effect[12]: The Ontario Emissions Trading Registry allocated Allowances to Ontario Power Generation Inc. (OPG), which then allocated them to its six electricity generation facilities fired by coal or oil.

Table 1: 2002 Emissions Allowances Allocation[13]

Name of Generating Station	Allowance Allocation (Kt)	
	NO	SO_2
Nanticoke	17.1	84.7
Lambton	10.2	36.0
Lakeview	3.0	18.0
Atikokan	1.3	5.5
Thunder Bay	2.1	8.3
Lennox	1.3	1.0
"Set aside" for Renewable Sources	1.0	4.0
Total	**36.0**	**157.5**

Note: emissions of NOx are measured as NO and not as NO_2 (1 unit of NO_2=1.553 units of NO)

Jan 1, 2002: Mandatory monitoring and reporting of emissions further expanded[14]: A range of other industrial, commercial and municipal facilities in Ontario have to track and publicly report on the 358 substances. This applies to all industrial sectors and municipalities with air emissions. The

regulations specify the thresholds for emission of these 358 substances. Emissions lower than the threshold are not required to be reported to the public or the government. However, emissions higher than the threshold must be reported. Continuous emissions monitoring systems (CEMs), or other approved emissions monitoring methods that are at least as accurate as the estimates from CEMs, are required to establish an inventory of these air emissions.

Jan 1, 2004: Regulation expanded to include other emitters[15]: All generators who have over 25 megawatts (MW) capacity; who sell or convey more than 20,000 megawatt-hours (MWh) of electricity to the Ontario Independent Market Operator (IMO)-controlled transmission grid in a year; and who emit more than trace amounts of NOx and SO_2; or generators who apply for and receive emission allowances will be covered by the cap and trade regulations.

C) Review of the Design of the Ontario's Emission Trading Program

Ontario has identified four fundamental processes that define its system of emissions caps and emissions reduction trading[16]:

1. Establishing Emissions Limits and Allocating the Allowances
2. Credit Creation
3. Credit and Allowance Use
4. Enforcement and Trading Administration

I. Establishing Emissions Limits and Allocating the Allowances

What sources should be included?

From January 1, 2002 to December 31, 2003 the sources that are included in the Ontario Emissions Trading program are the six OPG fossil fuel-fired plants[17]. Beginning in 2004, the Program will be expanded to include many other emitters[18], such as currently uncapped electricity generators. The Ministry also plans to expand this system to other major industrial emitters such as the pulp and paper sector, cement and concrete manufacturers, iron and steel manufacturers, petroleum refineries, chemical manufacturers, and non-iron smelters.

Which pollutants should be included?

Presently, NO and SO_2 are the only two pollutants addressed in this program. The following is a short description of both compounds.

- NO: precursors to the formation of ozone, a major constituent of smog and a known health hazard.
- SO_2: a primary ingredient of acid rain and a precursor to the formation of acid aerosols. When inhaled over time or in sufficient concentrations, SO_2 can cause serious health problems.

Future considerations include adding GHGs such as CO_2 to the list as well as toxic and cancer-causing compounds including mercury, cadmium, and arsenic.

At what level should the cap be set?

When the program is fully implemented in 2007, the limits will reduce NO by 53% and SO_2 by 25% from the baseline values. To depict these reductions more visually, they are estimated to be equivalent to taking more than one million passenger cars off Ontario's roads.

The Ontario Government plans to adjust the caps as new sources are added, and to lower them over time to help meet its commitments to reduce total NO emissions by 45% below 1990 levels and SO_2 emissions by 50% below 1999 allowable levels by 2015[19]. The most recent proposal calls for moving up the deadline for province-wide emissions reductions targets for NO and SO_2 from 2015 to 2010.

What mechanisms are being used to distribute allowances?

The Ontario Ministry of the Environment allocates NO and SO_2 emission allowances to OPG, who then distributes these allowances among their six large coal and oil-fired stations (Lakeview, Atikokan, Thunder Bay, Lambton, Nanticoke, and Lennox) (see Table 1).

Specifically, for NO, the Ministry will allocate 35 Kt/yr of emissions allowances to OPG for the years 2002 and 2003, 25 Kt for 2004, 22.4 Kt for 2005, 21.1 Kt for 2006 and 17 Kt for 2007. For SO_2 the Ministry will allocate 153.5 Kt/yr of emissions allowances for the years 2002 and 2003.

Beginning in 2004 for SO_2 and in 2008 for NO, all electric generators in the province will apply individually for allowance allocations based on their production estimates for the coming year.

When generators (in addition to the initial six OPG stations) are capped, allowances will be allocated by the Ontario government to these additional generators at the end of the year based on each station's electricity production during the year.

Further "set aside" emission allowances of 1Kt/yr of NO and 4 Kt/yr of SO_2 will be formed from within the allowances currently allocated to fossil fuel-fired plants. These allowances will be accessible to new conservation and renewable energy projects that displace electricity produced from coal or oil-fired plants. This "encouraged displacement" of fuel-fired stations' generated electricity with environmentally friendly sources of electricity is expected to provide a direct benefit to Ontario's air quality. At the end of each year unused portions of these allowances will be returned to OPG until the end of 2007, and to the common allowance pool beginning in 2008.

II. Credit Creation

How will emissions reductions credits (ERCs) be created and traded?

- **Approved Standard Methods for Emission Reductions:**

In order to obtain emission reduction credits, companies must implement an emission reduction project in accordance with approved standard methods (SM). Proponents with projects will either use one of the approved SMs or will propose a new one, which will undergo a review process and also become an approved SM if accepted. This approach is intended to enable the Ministry to ensure that proponents' projects are consistently evaluated and determined. The public gains the assurance that only quality projects are being given credits and the proponents avoid wasting time guessing what will be acceptable. The list of SMs will be expanded as time goes on and more projects are accepted.

An example of the approved SM for reducing emissions of NO is the installation of low-NOx burners on electricity generators. Low NOx burners are typically designed to reduce NO production in boilers. This is accomplished by controlling air/fuel mixing to affect combustion reaction. An example of the approved SM for reducing emissions of SO_2, is using fuels that have lower concentrations of sulphur, so that SO_2 emissions rates per unit of electricity produced can be reduced.

- **Quantification:**

Emissions reductions are created when, as a result of an emission reduction project, actual emission rates are less than the baseline emission rates. The baseline is defined as the emissions that would be expected to occur in the absence of the emission reduction project in the 12 months preceding the project's implementation.

To illustrate how reduction credits are quantified, the Standard Method for measurement of a SO_2 emission reduction credit is presented below:

ERs = (Baseline Emissions Rate – Actual Emissions Rate) * Actual Activity[20]

Where:
- ERs – emission reductions
- The Baseline Emissions Rate is the nanograms of SO_2 per Megawatt output from the plant in the absence of the emission reduction project (before a fuel switch)
  The Actual Emissions Rate is the nanograms of SO_2 per Megawatt output from the plant after the emission reduction project is introduced (after a fuel switch)
- The activity level is the megawatt output of the plant over the generation period.

Notes:
- It is important to note that both NO and SO_2 emissions are greatly affected by the percent operating capacity at which the generating unit is running.
- Measurement of NO reduction credits is based on a similar model.

- **Recording and Verification of ERCs**

Protocols, Emission Reduction Reports, and Verification Reports are the key documents involved in ERCs creation.

A protocol is a document that describes a specific emission reduction (ER) project. ER must be achieved in accordance with one of the approved SM.

An annual Emission Reduction Report is submitted to the Registry for ERC creation. The report must document what reductions of NO and SO_2 were actually achieved. A Verification Report is a report prepared by a qualified third-party. The report must indicate whether or not the ER meets all requirements specified in the Code.

- **Eligibility for ERCs:**

In order to be eligible for the creation of emission reduction credits (ERCs), the emission reductions of NO and/or SO_2 must have been accomplished through implementation of an approved SM. Emissions reductions that occurred between July 1, 1998 and January 1, 2000 that meet the requirements of the regulation and the Code, and were submitted to the PERT project prior to December 31, 2001 are also eligible for ERC creation. ERCs can be created for up to 7 years from the date in which the facility implemented an emission reduction project.

Furthermore, in order for an ERC to be created, an emission reduction must be real, surplus, quantifiable, unique, and verifiable. ERCs can be created by an emitter in Ontario, the 12 key States named in the Canada-US Ozone Annex commitment, which was signed in December 2000 (New York, Pennsylvania, New Jersey, Delaware, Maryland, West Virginia, Kentucky, Ohio, Michigan, Indiana, Illinois, Wisconsin), and the District of Columbia, all of which are not facing obligations under the regulation but which are taking actions to reduce emissions in their jurisdictions. This gives Ontario the unique opportunity to obtain credits from areas outside the province and diminish pollution at its source. Since more than 50 percent of Ontario's acid rain and smog-causing pollutants are blown in by prevailing winds from the United States, this feature of Ontario's emissions reduction trading system may have the potential to significantly improve air quality in the province.

III. Credit and Allowance Use

What kind of monitoring requirements should be imposed on emitters?

All generators facing NO and SO_2 limits under the regulation are required to install CEMs or other emissions monitoring methods approved by the Ministry of the Environment that are at least as accurate as the estimates from the CEMs and to report publicly their monitoring results. Future plans are being made to provide all data on-line for public access and timely reporting.

ERCs can be used to a maximum of 33% of allowances used for NOx and 10% of allowances used for SO_2. Furthermore, 10% of ERCs will be retired for the benefit of the environment, leaving 90% of ERCs presented and accepted to be used by emitters to meet compliance obligations. Allowances and ERCs can be traded freely, but the use of ERCs to meet emissions obligations in Ontario will be limited to those that originated in

Ontario, the 12 key States named in the Ozone Annex, and the District of Columbia Credits can only be claimed for a 12-month accumulation period, and allowances and ERCs may only be used once. Unused allowances and ERCs may be banked for a future use, subject to a discount factor.

IV. Enforcement and Trading Administration

What levels and methods of enforcement are necessary?

- **Penalties:**

An emitter that is subject to the regulation and whose emissions exceed the sum of its allowances plus ERCs presented for use will face penalties. These penalties will be determined in the courts. An example of penalties for SO_2 emissions elsewhere is the U.S. Acid Rain Program that charges a utility fine of $2000 per ton if that utility has emitted more sulfur than it is allowed[21]. It should be noted that this fine has never been levied as emissions reductions under that program went far beyond regulatory requirements.

- **Environmental SWAT Team:**

To strengthen existing enforcement activities the Ontario Government created a permanent Environmental SWAT Team. Using a risk assessment framework, the team selects sectors to inspect based on factors such as the sectors' history of non-compliance and the potential for major human health and/or environmental impacts. The inspectors may issue orders and tickets, and refer cases for further investigation. The Environmental SWAT Team then communicates the inspection results to the public and sector associations to promote proactive compliance activities. The team also provides diagnostic information about the sectors to other areas of the ministry for additional follow up.

What kind of Administration is necessary?

- **The Ontario Emissions Trading Registry:**

The Ontario Ministry of the Environment and Energy is responsible for establishing the registry but maintaining and operating will be contracted out. The operator of the Registry will maintain a web site and make the Registry accessible to the public by way of this medium.

At present, the transitional registry has been established to provide notice to the public of the distribution and retirement of NO and SO_2 emission allowances and of the creation and retirement of NO and SO_2 ERCs. It is also to provide the public with access to all documentation submitted in support of an application to create an ERC including but not limited to the Protocol, the Emission Reduction Report, and the Verification Report. The registry records decisions about credit creation and credit and allowance retirement. In addition, the registry controls the transfer of allowances and ERCs between different accounts. The Registry keeps track of the amount being transferred, the amount remaining with the current holder, the name and address of the current holder and the recipient of allowances or ERCs.

As for actual trading, the allowances and ERCs will be listed on an established commodity exchange such as Chicago Board of Trade and/or the TSE.

What are the linkages of the Ontario system to American NOx and SO_2 trading?

- **Cross-boundary issues**

Addressing environmental concerns and formulating environmental policy becomes increasingly difficult for cross-boundary issues. For air pollutants such as NOx and SO_2, jurisdictional issues can arise between different levels of government and internationally as well. One of the main concerns is the ability of the Ontario's program to harmonize with current and future programs in the U.S., as U.S. sources account for 50% of the smog in Ontario. Presently, ERCs originating in Ontario are not tradable in the U.S. under the Environmental Protection Agency's restrictions on foreign originated ERCs[22]. However, since the northeast U.S. is a part of the Ontario credit eligibility zone, Ontario's companies are allowed to use credits created by American emitters.

- **MBIs Liquidity issues**

The price of ERCs will be determined in the market by supply and demand. As they are not transferable with other emissions trading programs, such as the SO_2 emissions trading program in the US, the demand for ERCs created in Ontario, and in turn their liquidity, could potentially be low.

D) Other Relevant Information

The following section serves to review the most recent initiatives related to Ontario's environment and emission trading undertaken by different parties:

- **Deregulation of Ontario's Electricity Market**

  In May 2002 Ontario's electricity market was opened to competition. OPG, which currently has about 85% of Ontario's electricity market and is fully owned by the provincial government, is required to reduce its share to no more than 35% within 10 years. In addition, no other company will be allowed to control more that 25% of market[23]. It is not certain how and if deregulation will affect NOx and SO_2 emission trading.

- **Refurbishing of nuclear generation units.**

  At present, 30% of OPG's electric generation capacity comes from fossil-fired units, 40% from nuclear units, and the remaining 30% from hydroelectric units. It is possible, however, that as nuclear generation units currently being refurbished come back into service, OPG's emissions could fall below the established caps, due to diminished activity of fossil fuel-fired stations.

- **Agreement between OPG and the U.S. Federal Energy Regulatory Commission[24]**

In April 2002, OPG received conditional approval from the U.S. Federal Energy Regulatory Commission for a license to export electricity to the United States. Environmental groups that suspect that OPG will use coal-fired power plants to satisfy this new demand opposed the license. If their concerns prove justified, more NO and SO_2 will end up in Ontario's air, since both NO and SO_2 emissions are greatly affected by the capacity at which a fossil combustion unit operates[25].

- **U.S. EPA creates online emissions trading system for NOx and SO_2[26]**

Participants involved in the American SO_2 cap and trade programs may trade allowances for these pollutants on the Internet instead submitting papers forms to the U.S. EPA under the agency's Online Allowance Transfer System (OATS). EPA hopes OATS will streamline and accelerate emissions trading of SO_2 and NOx allowances that are valued at approximately US$ 20 billion. This may impact the administration of the Ontario and other comparable systems in time.

E) Some Learnings for Alberta

1. Ontario introduced emissions trading in a relatively short time. The Ontario Air Quality and Climate Change Strategy was released in May 2001 and the Ontario emissions trading program came into force on December 31, 2001. The system will be phased in and some detail appears to remain to be developed, but it will shortly be operational. There may be advantages to putting an emissions trading system in place and then refining it, as opposed to refining every detail before implementing a system.

2. Emissions trading is viable only if there are sufficient participants in the market with sufficient variation in marginal abatement costs. These requirements could be a potential problem for the Ontario Emission Trading system due to its incompatibility with systems in other jurisdictions, mainly in the U.S., which contributes to over 50% of the pollution in the province. Unlike the northeast of the U.S., where cap and trade exists, and where many coal-fired stations operate, Ontario lacks large numbers of significant emitters. In order to create a feasible market in the absence of formal cross-border trading, Ontario had to allow the U.S. created credits to enter its system. However, ERCs originating in Ontario are not tradable in the U.S. under the Environmental Protection Agency's restrictions[27]. This suggests the importance of any Alberta trading system being compatible, if possible, with systems in other jurisdictions that might fall within a common trading area. This could be more beneficial not only to the environment but also to the program's participants who could increase their revenues by selling their allowances and ERCs to these jurisdictions.

3. Based on the U.S. experience with the Acid Rain Program, there may be major advantages to including all electric power sources at the same time and tightening the cap over time instead of dividing the market into regulated and non-regulated sources and beginning with a small number of electric power emitters. The U.S. EPA points out that it was extremely difficult and resource-intensive to address the issue of utilization switches from regulated to non-regulated sources. It is suggested that only very small and clean units where reductions are not feasible and the cost per ton emissions measurement is very high are eligible for exemptions[28]. In addition, as Andrew Muller, a

Professor of Economics at McMaster University noted, the ERCs generated by the non-capped sector may represent very low cost ways of reducing emissions. As the ERCs generated in these low cost ways are offered to the market, they will reduce the price of both ERCs and allowances. As allowances and ERCs prices fall, firms in a capped sector have a reduced incentive to control their emissions[29].

4. The inclusion of automatic, expensive penalties for non-compliance resulted in 100% compliance in the case of the U.S. SO_2 cap and trade program. Certainty in the enforcement of a program reinforces the credibility of the program. In Ontario, penalties for non-compliance will be determined in the courts. The level of these penalties remains to be seen.

5. Public accountability and transparency are the centerpieces of the U.S. and Ontario emissions trading programs. Governments retain legal authority for transparency of the programs and public dissemination of information, for enforcement and compliance including verification of emissions and of emissions reductions, for measurement monitoring quality assurance, for tracking transfers of allowances and ERCs, and for ensuring allowances cover emissions each year. There could be ment in following the U.S. and Ontario emissions trading programs examples on these points and ensuring that accountability for emissions trading in the province remains with the government.

6. There could be advantages to phasing in emissions trading. Although Ontario started with covering only two pollutants and six sources, it is currently consulting on expanding emissions limits to other key industrial sectors, covering other pollutants and further reducing existing caps.

7. An important step in developing the Ontario Emissions Trading Program was inviting stakeholders to submit comments on the code. Stakeholders were given a one month period for submission of opinions. Some of the suggestions were implemented into the final draft of the Code. Stakeholder involvement is critical to a successful emissions trading program.

Acronym Keys:

CEM	Continuous Emission Monitoring
EPA	Environmental Protection Agency
ER	Emission Reduction
ERC	Emission Reduction Credit
GHGs	Greenhouse Gases
Kt/yr	Kilotonnes a year
MBI	Market Based Instrument
OPG	Ontario Power Generation
NO	Nitrogen oxide
NO2	Nitrogen dioxide
NOx	Nitrogen oxides; all oxides of nitrogen except nitrous oxide (N_2O)
PERT	The Pilot Emissions Reduction Trading
SM	Standard Method
SO_2	Sulphur dioxide

References:

[1] Barg, Stephan, Anantha Duraiappah, and Sarah Van Exan. Economic Instruments for Environmental Policy Making in Ontario. International Institute for Sustainable Development. December 1, 2000.

[2] See Ontario Ministry of the Environment and Energy website. April-May 2002. http://www.ene.gov.on.ca

[3] Notes for remarks by the Honourable Dan Newman, Minister of the Environment at the International Emissions Trading Association (IETA) Annual General Meeting. The Hague, Netherlands. November 21, 2000.

[4] See Ontario Ministry of the Environment and Energy website. April-May 2002. http://www.ene.gov.on.ca and Pilot Emission Reduction Trading (PERT) Project Letter of Understanding between the Ministry of the Environment and Corporate Participants in Emissions Trading Activities. July 8, 1998.

[5] See endnote 2

[6] Statement to the Ontario Legislature by the Honourable Elizabeth Witmer, Minister of the Environment. Queen's Park, Toronto, Ontario. May 2, 2001.

[7] Ibid

[8] Ibid

[9] Ibid

[10] See endnote 2

[11] Ontario Emissions Trading Code. Air Policy and Climate Change Branch, Ontario Ministry of the Environment. December 2001.

[12] Ibid

[13] See endnote 2

[14] Ibid

[15] Ibid

[16] Ibid

[17] See endnote 11

[18] See endnote 2

[19] Haites, Erik. NOx and SO_2 emissions trading in Ontario. Environmental Finance, September 2000.

[20] See endnote 11

[21] United States Environmental Protection Agency website. April-May, 2002. http://www.epa.gov/airmarkets/arp/.

[22] Gowlings paper.

[23] Haites, Erik. NOx and SO_2 emissions trading in Ontario. Environmental Finance, September 2000.

[24] Ontario Clean Air Alliance website. April 2002. www.cleanairalliance.org.

[25] See endnote 11

[26] The Gallon Environment Letter, Vol.6, No.9, Montreal, May 12, 2002

[27] See endnote 22

[28] Comments from U.S. Environmental Protection Agency: Emissions Reduction Trading System for Ontario. June 22, 2001.

[29] Muller, Andrew. Comments on the Discussion Paper "Emissions Reduction Trading System for Ontario" issued March 24, 2001, by the Government of Ontario. Department of Economics, McMaster University, Hamilton, Ontario, June 24, 2001.